USER MANUAL

VAB-820

Pico-ITX Freescale Cortex-A9 board

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This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his personal expense.

Notice 1

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Notice 3

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FOR HOME OR OFFICE USE

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- ☐ Only use the appropriate battery specified for this product.
- ☐ Do not re-use, recharge, or reheat an old battery.
- ☐ Do not attempt to force open the battery.
- ☐ Do not discard used batteries with regular trash.
- ☐ Discard used batteries according to local regulations.

Safety Precautions

- ☐ Always read the safety instructions carefully.
- ☐ Keep this User's Manual for future reference.
- ☐ All cautions and warnings on the equipment should be noted.
- ☐ Keep this equipment away from humidity.
- ☐ Lay this equipment on a reliable flat surface before setting it up.
- ☐ Make sure the voltage of the power source and adjust properly 110/220V before connecting the equipment to the power inlet.
- ☐ Place the power cord in such a way that people cannot step on it.
- ☐ Always unplug the power cord before inserting any add-on card or module.
- ☐ If any of the following situations arises, get the equipment checked by authorized service personnel:
  - The power cord or plug is damaged.
  - Liquid has penetrated into the equipment.
  - The equipment has been exposed to moisture.
  - The equipment has not worked well or you cannot get it work according to User's Manual.
  - The equipment has dropped and damaged.
  - The equipment has obvious sign of breakage.
- ☐ Do not leave this equipment in an environment unconditioned or in a storage temperature above 60°C (140°F). The equipment may be damaged.
- ☐ Do not leave this equipment in direct sunlight.
- ☐ Never pour any liquid into the opening. Liquid can cause damage or electrical shock.
- ☐ Do not place anything over the power cord.
- ☐ Do not cover the ventilation holes. The openings on the enclosure protect the equipment from overheating

Box Contents and Ordering Information

VAB-820

- ☐ 1 x VAB-820 embedded board (with Freescale i.MX ARM Cortex-A9)
- ☐ 1 x DC-in power cable
- ☐ 1 x Audio cable
- ☐ 1 x USB cable
- ☐ 1 x COM cable (3-wired for the debug of console)

Table of Contents

1. Product Overview 9
1.1. Key Features 10
1.2. Product Specifications 11
1.3. Layout Diagram 14
1.4. Product Dimensions 16
1.5. Height Distribution 17

2. I/O Interface 18
2.1. External I/O Ports 18
2.1.1. RJ-45 LAN port: Gigabit Ethernet 19
2.1.2. USB 2.0 Port 20
2.1.3. HDMI® Port 21
2.1.4. RCA Jack 22
2.1.5. Micro SD Card slot 23
2.2. Onboard Connectors 24
2.2.1. USB, USBOTG Pin Header 24
2.2.2. Front Audio Pin Header 25
2.2.3. DIO, I²C, System reset, P_LED, and WLAN_LED Pin Header 26
2.2.4. CMOS Battery Connector 28
2.2.5. SPI connector 29
2.2.6. POE Pin Header 30
2.2.7. +12V DC-In Connector 31
2.2.8. S-Video Input Pin Header 32
2.2.9. Mini-PCIe Slot 33
2.2.10. LVDS1 Connector 35
2.2.11. LVDS Inverter Connector 37
2.2.12. MIPI CSI-2 Connector 38
2.2.13. COM1/COM2/CAN Connector 39

3. Jumpers 40

3.1. LVDS Power Select Jumper 40
3.2. Boot Select Jumper 42

4. Hardware Installation 43
4.1. Installing into a Chassis 43
4.1.1. Suggested minimum chassis dimensions 43
4.1.2. Suggested minimum chassis height 45
4.1.3. Suggested keepout areas 46
4.2. Installation of Mini-PCIe module 47

Appendix A. Mating Connector Vendor Lists 49

Lists of Figures

Figure 1: Layout diagram of the VAB-820 mainboard (top and bottom view). 14
Figure 2: Mounting holes and dimensions of the VAB-820 16
Figure 3: Height distribution of the VAB-820 mainboard 17
Figure 4: Rear I/O ports 18
Figure 5: Front I/O port 18
Figure 6: Gigabit Ethernet port pinout diagram 19
Figure 7: USB 2.0 port diagram 20
Figure 8: HDMI® port diagram 21
Figure 9: RCA jack diagram 22
Figure 10: Micro SD card slot diagram 23
Figure 11: USB, USBOTG pin header diagram 24
Figure 12: Front Audio pin header diagram 25
Figure 13: DIO, I²C, System reset, P_LED, and WLAN_LED combination pin header diagram 26
Figure 14: CMOS battery connector diagram 28
Figure 15: SPI connector diagram 29
Figure 16: POE Output/Input pin header diagram 30
Figure 17: 12V DC-In connector diagram 31
Figure 18: S-Video input pin header diagram 32
Figure 19: Mini-PCIe slot diagram 33
Figure 20: LVDS1 connector diagram 35
Figure 21: LVDS Inverter Connector diagram 37
Figure 22: MIPI CSI-2 connector diagram 38
Figure 23: COM1/COM2/CAN connector diagram 39
Figure 24: LVDS power select jumper diagram 40
Figure 25: Boot Select jumper diagram 42
Figure 26: Suggested minimum chassis dimensions 43
Figure 27: Suggested minimum internal chassis ceiling height 45
Figure 28: Suggested keepout areas 46

Lists of Tables

Table 1: Layout diagram description table of the VAB-820 mainboard 15
Table 2: Layout diagram description table of rear I/O ports 18
Table 3: Gigabit Ethernet port pinout 19
Table 4: Gigabit Ethernet LED color definition 19
Table 5: USB 2.0 port pinout 20
Table 6: HDMI® port pinout 21
Table 7: RCA Jack pinout 22
Table 8: Micro SD card slot pinout 23
Table 9: USB, USBOTG pin header pinout 24
Table 10: Front Audio pin header pinout 25
Table 11: DIO, I²C, System reset, P_LED, and WLAN_LED pin header pinout 27
Table 12: CMOS battery connector pinout 28
Table 13: SPI connector pinout 29
Table 14: POE Output pin header pinout 30
Table 15: POE Input pin header pinout 30
Table 16: 12V DC-In connector pinout 31
Table 17: S-Video input pin header pinout 32
Table 18: Mini-PCIe slot pinout 34
Table 19: LVDS1 connector pinout 36
Table 20: LVDS Inverter Connector pinout 37
Table 21: MIPI CSI-2 connector pinout 38
Table 22: COM1/COM2/CAN connector pinout 39
Table 23: LVDS power select jumper setting 41
Table 24: Boot Select jumper settings 42
Table 25: VAB-820 mating connector vendor lists 49

1. Product Overview

Based on the ultra compact Pico-ITX form factor, measuring 10 cm x 7.2 cm, the VIA VAB-820 is a VIA Pico-ITX board to feature an ARM SoC. With a 1.0GHz Freescale Cortex-A9 ARM SoC, the VIA VAB-820 combines three independent, integrated GPUs for 3D/2D graphics acceleration and supports multiple displays.

The ultra compact VIA VAB-820 Pico-ITX is optimized for both performance and power to meet the high end demands of advanced industrial and in-vehicle applications, boasting a ruggedized design with an extended operating temperature range from -20 to 70°C, while offering extremely low power consumption.

The VIA VAB-820 provides an impressive selection of rear I/O in a compact form factor including HDMI® port, two USB 2.0 ports, one composite input RCA jack and one RJ-45 GLAN port. Customers can take advantage of VIA's industry leading hardware and software support to create customized designs with a quick time to market. The VIA VAB-820 is also available with board support packages (BSP) for the Android 4.2.2 and Embedded Linux 3.0.35 operating systems.

On board pin headers provide support for an additional of two COM connectors with power supply, one dual-channel LVDS connector, one RTC battery connector, one micro SD card slot, one Mini-PCIe connector, one MIPI CSI-2 connector and eight GPIO pin headers, etc.

1.1. Key Features

- Supports independent, integrated graphics processing (GPU) for 3D/2D and graphics acceleration and multiple displays
- Supports HDMI® port, RJ-45 LAN port and composite input RCA jack
- Supports four USB 2.0 ports (two as pin header)
- Supports one dual-channel 18/24-bit LVDS connector
- Supports two COM connectors with power supply
- Supports two Controller Area Network (FlexCAN)
- Small form factor and low power design
- Fanless and ultra low power consumption
- 4GB onboard eMMC Flash memory
- Support Mini-PCIe x1 connector and Micro SD card slot for expandable storage
- Compatible with Android 4.2.2 and Embedded Linux 3.0.35

1.2. Product Specifications

- **Processor**
  - Freescale i.MX 6Dual/6Quad ARM Cortex-A9 @ 1.0 GHz
- **Flash Storage**
  - 4MB SPI Serial Flash
  - 4GB eMMC Flash
- **Graphics**
  - Support three independent, integrated graphics processing units: an OpenGL® ES 2.0 3D graphics accelerator with four shaders (up to 200 MT/s and OpenCL support), 2D graphics accelerator, and dedicated OpenVG™ 1.1 accelerator
- **System Memory**
  - Onboard 1GB DDR3-1066 SDRAM using 128M x16 memory devices (up to 2GB with 256M x 16 devices)
- **Ethernet**
  - Micrel KSZ9031RNXIA Gigabit Ethernet Transceiver with RGMII Support
- **Audio**
  - Freescale SGTL5000 Low Power Stereo Codec
- **Video Decoder**
  - ADI ADV7180 8-Bit, 4× Oversampling SDTV Video Decoder
- **HDMI**
  - Integrated HDMI 1.4 Transmitter
- **USB**
  - SMSC USB2514 USB 2.0 High Speed 4-Port Hub Controllers
- **Onboard I/O**
  - 2 X COM connectors with power supply (one supports 8-wire, while the other supports 2-wire, CAN1 and CAN2)
  - 1 X Dual-channel, 18/24-bit LVDS connector
  - 1 X RTC battery connector
  - 1 X MIPI CSI-2 connector (supports 2 data lanes)
  - 1 x LVDS panel connector

- 1 x LVDS Inverter connector
- 1 x LVDS panel power select jumper
- 1 X SPI connector
- 1 X S-Video input pin header
- 2 X POE pin headers (support optional PD power board)
- 1 X Front audio pin header for line-in, line-out and MIC-in
- 1 X Boot select jumper (for SPI or micro SD)
- 1 X USB and USB OTG pin header
- 1 X 1 x DIO, I²C, System reset, Power LED, and WLAN LED pin header
- 1 X 12V DC-in power connector
- 1 X Mini-PCIe slot (supports multiple connections and buses including JTAG)

- **Front Panel I/O**
  - 1 X Micro SD card slot

- **Back Panel I/O**
  - 1 X HDMI port
  - 2 X USB 2.0 ports
  - 1 X RJ-45 LAN port (supports optional IEEE802.3at Type 2)
  - 1 X Composite input RCA jack

- **WatchDog Timer**
  - The Watchdog Timer supports two comparison points during each counting period. Each of the comparison points is configurable to evoke an interrupt to the ARM core, and a second point evokes an external event on the WDOG line

- **Power**
  - 12VDC

- **Operating System**
  - Embedded Linux 3.0.35
  - Android 4.2.2

- **Operating Conditions**
  - **Operating Temperature**
    - -20°C ~ 70°C
  - **Operating Humidity**
    - 0% ~ 95% (relative humidity; non-condensing)
  - **Storage Temperature**
    - -40°C ~ 70°C

- **Form Factor**
  - 8-layers PCB
  - 10 cm x 7.2 cm

Note:

1. For the software evaluation, please visit VIA Embedded website to download the image: **http://www.viaembedded.com/en/downloads/EvaluationKit.jsp**

2. After the VAB-820 is shut down, it remains in stand by mode so that some components may retain power. If user has concern about power consumption during shut down, it is recommended to directly unplug the AC adapter from the board.

1.3. Layout Diagram

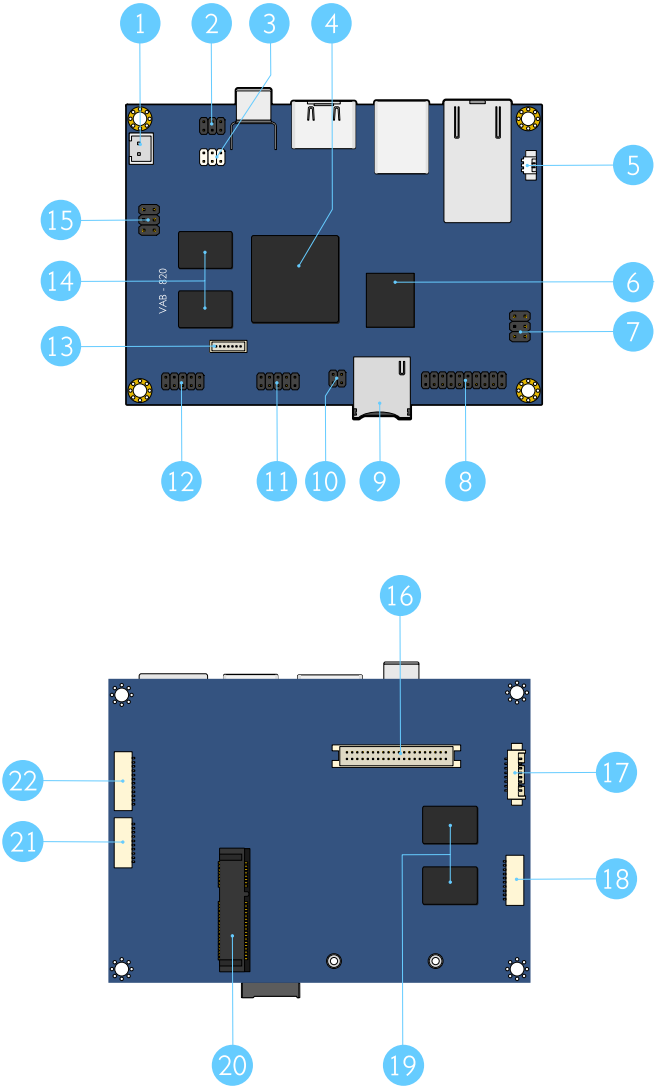


Figure 1: Layout diagram of the VAB-820 mainboard (top and bottom view)

Item	Description
1	+12V DC-In connector (J9)
2	S-VIDEO input pin header (S-VIDEO1)
3	LVDS power select jumper (J3)
4	Freescale i.MX 6Dual/6Quad ARM Cortex-A9 processor
5	CMOS Battery connector (J1)
6	eMMC Flash
7	POE Input pin header (J13)
8	DIO, I²C, System reset, Power LED, and WLAN LED combination pin header (J7)
9	Micro SD card slot
10	Boot flash Select jumper (J11)
11	USB and USBOTG combination pin header (J8)
12	Front Audio pin header (AUDIO1)
13	SPI connector (J10)
14	DDR3 1066 SDRAM memory
15	POE Output pin header (J14)
16	LVDS panel connector (LVDS1)
17	LVDS Inverter connector (INVERTER)
18	COM2/CAN connector (J5)
19	DDR3 1066 SDRAM memory
20	Mini-PCIe slot (MINIPCIE)
21	COM1 connector (J4)
22	MIPI CSI-2 connector (J18)

Table 1: Layout diagram description table of the VAB-820 mainboard

1.4. Product Dimensions

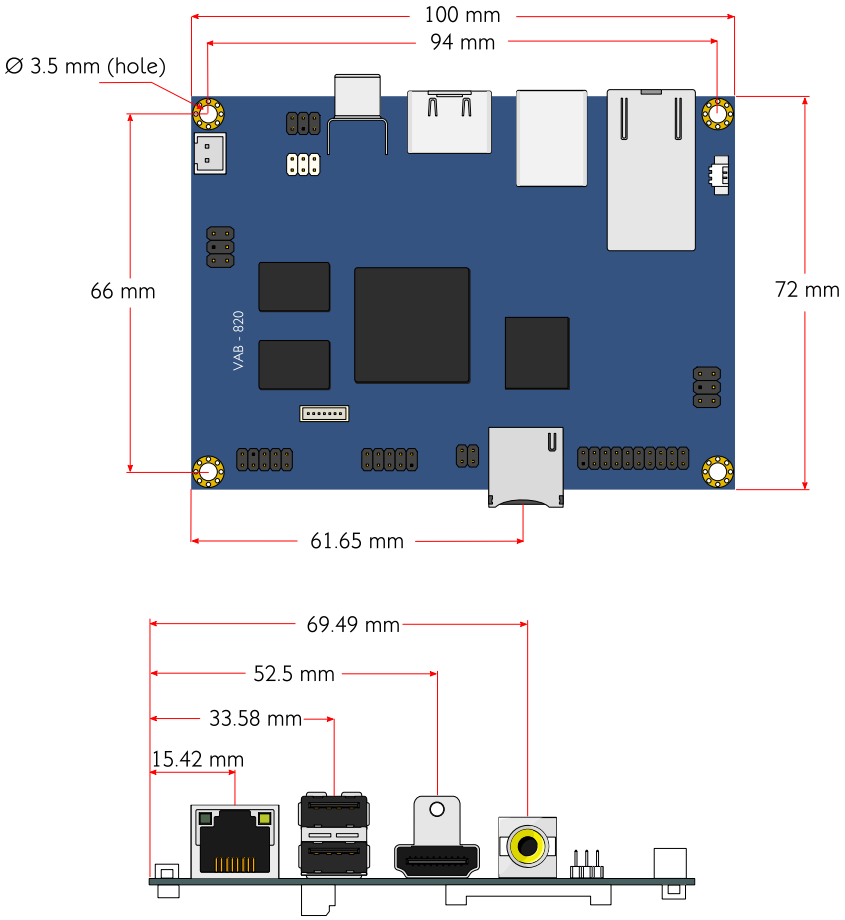


Figure 2: Mounting holes and dimensions of the VAB-820

1.5. Height Distribution

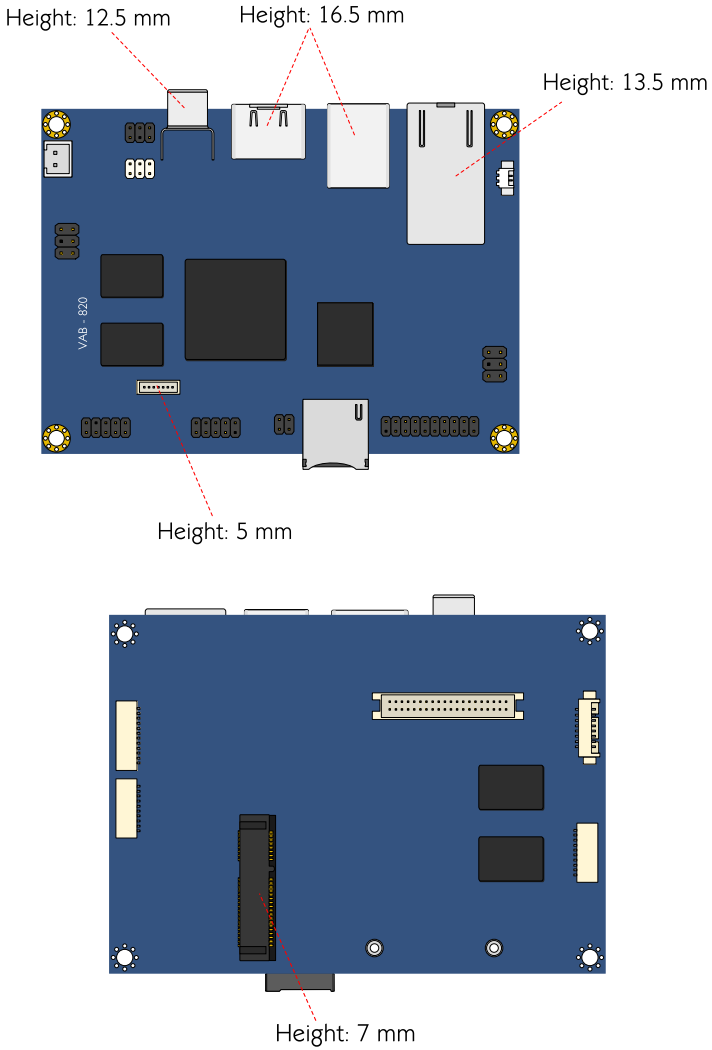


Figure 3: Height distribution of the VAB-820 mainboard

2. I/O Interface

The VAB-820 has a wide selection of interfaces. It includes a selection of frequently used ports as part of the external I/O coastline.

2.1. External I/O Ports

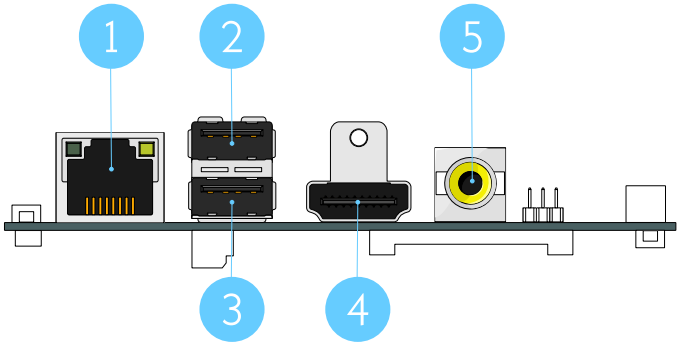


Figure 4: Rear I/O ports

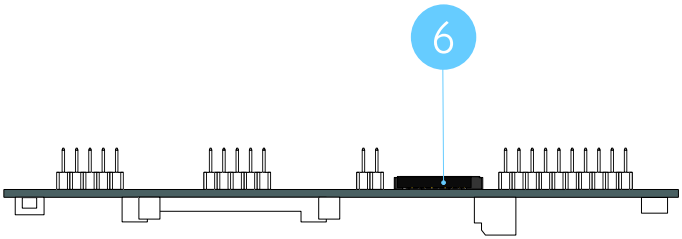


Figure 5: Front I/O port

Item	Description
1	J16: RJ-45 LAN port
2	USB1: USB 2.0 port 2
3	USB0: USB 2.0 port 1
4	HDMI1: HDMI® port
5	J15: Composite input RCA jack
6	Micro SD card slot

Table 2: Layout diagram description table of rear I/O ports

2.1.1. RJ-45 LAN port: Gigabit Ethernet

The integrated 8-pin Gigabit Ethernet port is using an 8 Position 8 Contact (8P8C) receptacle connector (commonly referred to as RJ45). The pinout of the Gigabit Ethernet port is as shown below.

Pin	Signal
1	Signal pair 1+
2	Signal pair 1-
3	Signal pair 2+
4	Signal pair 3+
5	Signal pair 3-
6	Signal pair 2-
7	Signal pair 4+
8	Signal pair 4-

Table 3: Gigabit Ethernet port pinout

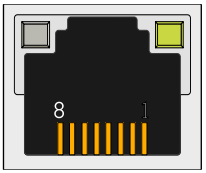


Figure 6: Gigabit Ethernet port pinout diagram

The Gigabit Ethernet port (RJ45 port) has two individual LED indicators located on the front side to show its Active/Link status and Speed status.

	Link LED (Left LED on RJ-45 connector)	Active LED (Right LED on RJ-45 connector)
Link Off	Off	Off
Speed_10Mbit	The LED is always On in Orange color	Flash in Yellow color
Speed_100Mbit	The LED is always On in Orange color	Flash in Yellow color
Speed_1000Mbit	The LED is always On in Orange color	Flash in Yellow color

Table 4: Gigabit Ethernet LED color definition

2.1.2. USB 2.0 Port

The VAB-820 mainboard provides two USB 2.0 ports, Each USB port gives complete Plug and Play and hot swap capability for external devices. The USB interface complies with USB UHCI, Rev. 2.0. The pinout of the typical USB 2.0 port is shown below.

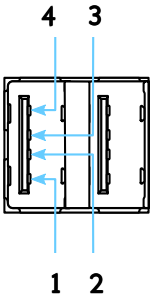


Figure 7: USB 2.0 port diagram

USB1		USB2	
Pin	Signal	Pin	Signal
1	VCC	1	VCC
2	USB data -	2	USB data -
3	USB data +	3	USB data +
4	GND	4	GND

Table 5: USB 2.0 port pinout

2.1.3. HDMI® Port

The integrated 19-pin HDMI® port uses an HDMI® Type A receptacle connector defined in HDMI specification. The HDMI® port is used to connect high definition video and digital audio using a single cable. It allows connecting the digital video devices which utilize a high definition video signal. The pinout of the HDMI® port is shown below.

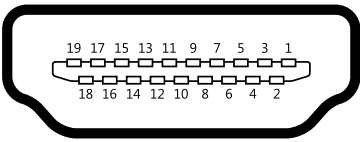


Figure 8: HDMI® port diagram

Pin	Signal	Pin	Signal
1	TMDS Data0+	2	GND
3	TMDS Data0–	4	TMDS Data1+
5	GND	6	TMDS Data1–
7	TMDS Data2+	8	GND
9	TMDS Data2–	10	TMDS Data3+
11	GND	12	TMDS Data3–
13	CEC	14	NC
15	HDMI Clock	16	HDMI Data
17	GND	18	HDMI Power
19	Hot Plug Detect		

Table 6: HDMI® port pinout

2.1.4. RCA Jack

The RCA jack connects to external composite video input device.

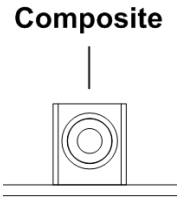


Figure 9: RCA jack diagram

Description	RCA Jack
Video	Composite Video Input

Table 7: RCA Jack pinout

2.1.5. Micro SD Card slot

The VAB-820 comes with a Micro SD card slot located at the front side of the board. Micro SD card slot offers expandable storage.

Figure 10: Micro SD card slot diagram

Pin	Signal
1	SD0DATA2
2	SD0DATA3
3	SD0CMD
4	VDD (3.3V)
5	SD0CLK
6	GND
7	SD0DATA0
8	SD0DATA1
9	SD0_CD

Table 8: Micro SD card slot pinout

2.2. Onboard Connectors

2.2.1. USB, USBOTG Pin Header

The mainboard includes one USB and USBOTG combination pin header block labeled as "J8". The combination pin header is for connecting USB and USBOTG devices. The pinout of the pin header is shown below.

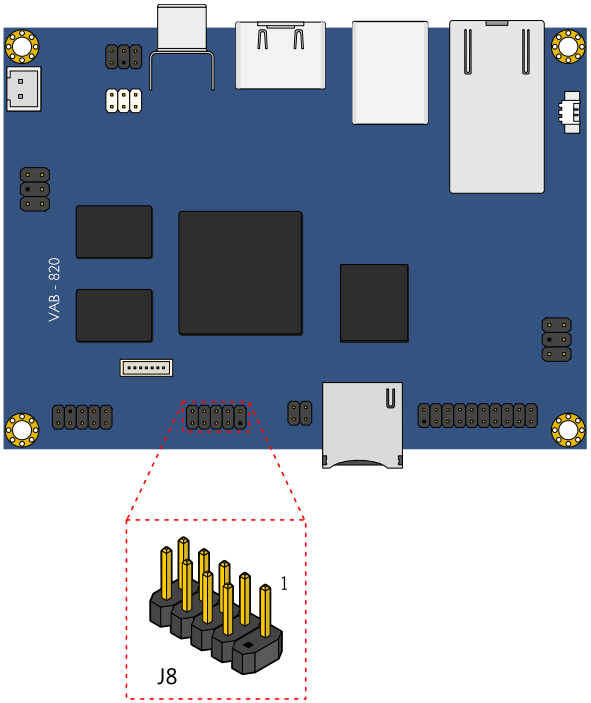


Figure 11: USB, USBOTG pin header diagram

Pin	Signal	Pin	Signal
1	GND	2	-
3	USB_OTG_ID	4	GND
5	OTG_DP	6	USBD_T3+
7	OTG_DN	8	USBD_T3-
9	OTG_VBUS	10	USB_VBUS

Table 9: USB, USBOTG pin header pinout

2.2.2. Front Audio Pin Header

The mainboard has a pin header for Line-out, Line-in and MIC-in. The pin header is labeled as "AUDIO1". The pinout of the pin header is shown below.

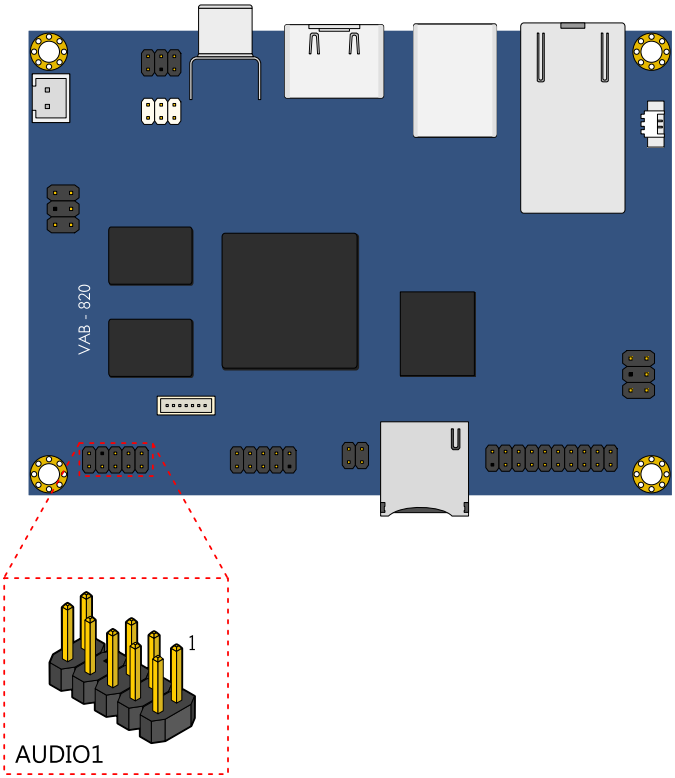


Figure 12: Front Audio pin header diagram

Pin	Signal	Pin	Signal
1	HEAD_RIGHT	2	HEAD_LEFT
3	LINE_IN_R	4	LINE_IN_L
5	MIC_IN	6	MIC_IN
7	-	8	NC
9	GND_ANALOG	10	GND_ANALOG

Table 10: Front Audio pin header pinout

2.2.3. DIO, I²C, System reset, P_LED, and WLAN_LED Pin Header

The mainboard includes one DIO, I²C, System reset, P_LED, and WLAN_LED combination pin header block labeled as "J7". The combination pin header is for connecting Digital I/O (GPIO), I²C devices and providing access to system reset switch, power LED and WLAN LED. The pinout of the pin header is shown below.

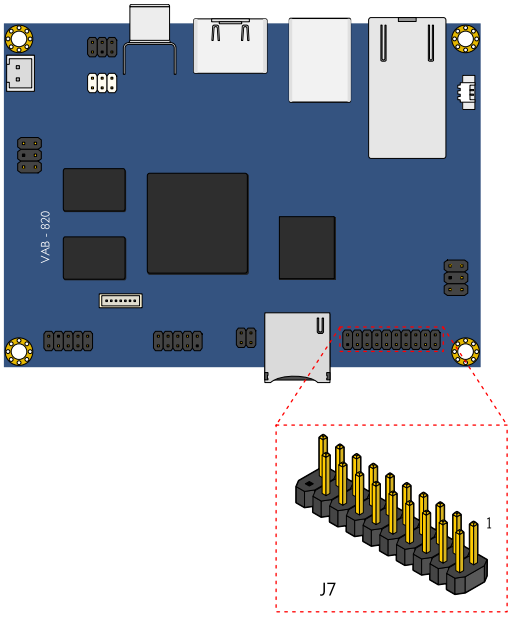


Figure 13: DIO, I²C, System reset, P_LED, and WLAN_LED combination pin header diagram

Pin	Signal	Pin	Signal
1	RESET_N	2	P_LED+
3	GND	4	P_LED-
5	12C3_SCL	6	W_LED+
7	12C3_SDA	8	W_LED-
9	5VIN	10	GND
11	GPIO_1	12	GPIO_7
13	GPIO_2	14	GPIO_8
15	GPIO_4	16	GPIO_9
17	GPIO_5	18	GPIO_16
19	GND	20	-

Table 11: DIO, I²C, System reset, P_LED, and WLAN_LED pin header pinout

2.2.4. CMOS Battery Connector

The mainboard is equipped with onboard CMOS battery connector used for connecting the external cable battery that provides power to the CMOS RAM. If disconnected all configurations in the CMOS RAM will be reset to factory defaults. The CMOS battery connector is labeled as "J1". The connector pinout is shown below.

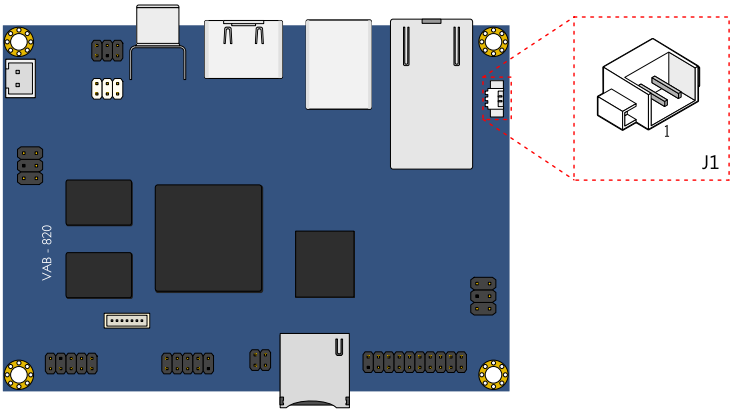


Figure 14: CMOS battery connector diagram

Pin	Signal
1	+VBAT
2	GND

Table 12: CMOS battery connector pinout

2.2.5. SPI connector

The mainboard has one 7-pin SPI flash connector. The SPI (Serial Peripheral Interface) connector is used to communicate with external slave devices. The connector is labeled as "J10". The pinout of the connector is shown below.

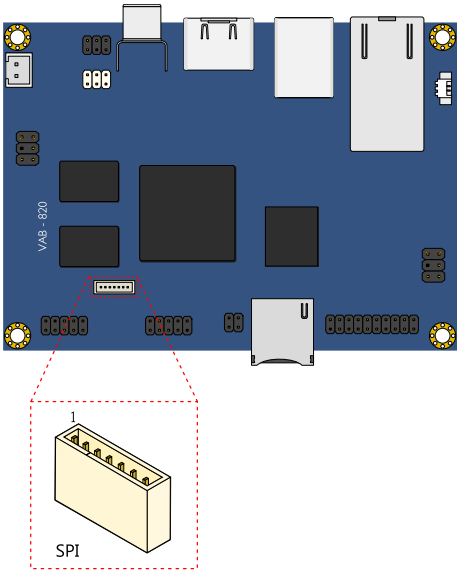


Figure 15: SPI connector diagram

Pin	Signal
1	CSPI3_CLK
2	CSPI3_MOSI
3	CSPI3_MISO
4	3P3V
5	CSPI3_CS0
6	GND
7	CSPI3_CS1

Table 13: SPI connector pinout

2.2.6. POE Pin Header

The mainboard has two POE pin headers. The POE pin headers are used to connect to optional PD power board for implementation of Power Over Ethernet. The POE input connector is labeled as "J13". The POE output connector is labeled as "J14". The pinout of the connector is shown below.

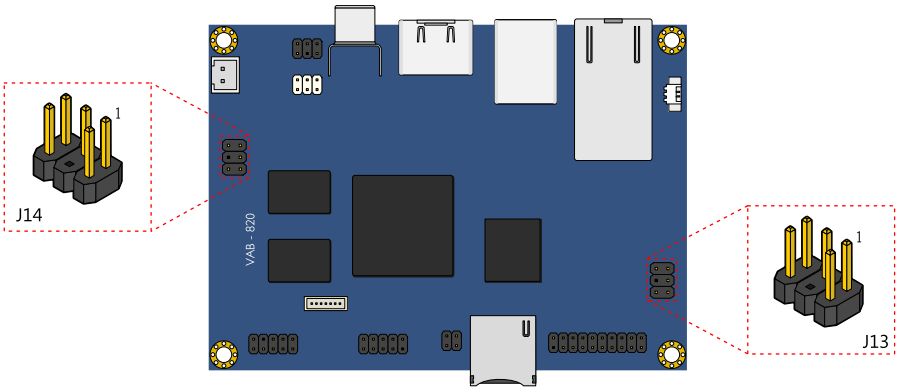


Figure 16: POE Output/Input pin header diagram

J14: Output			
Pin	**Signal**	**Pin**	**Signal**
1	POE_12V	2	POE_12V
3	NC	4	-
5	GND	6	GND

Table 14: POE Output pin header pinout

J13: Input			
Pin	**Signal**	**Pin**	**Signal**
1	WIRE1	2	WIRE2
3	NC	4	-
5	WIRE3	6	WIRE4

Table 15: POE Input pin header pinout

2.2.7. +12V DC-In Connector

The mainboard supports +12V DC-In power connector to provide addition power to the rest of the system. The 2-pin power connector is used to connect the DC-In power jack. The connector is labeled as "J9". The pinout of the connector is shown below.

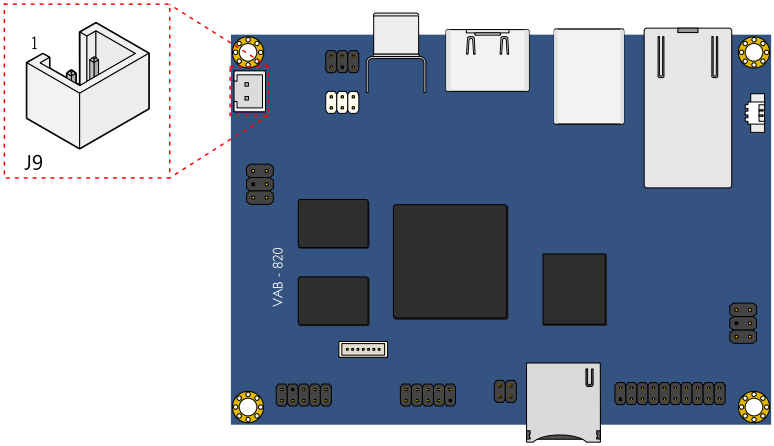


Figure 17: 12V DC-In connector diagram

Pin	Signal
1	+12V
2	GND

Table 16: 12V DC-In connector pinout

2.2.8. S-Video Input Pin Header

The mainboard provides an S-Video Input pin header. The S-Video Input pin header is an analog video connector for connecting TV monitor or S-Video input devices. The pinout of the S-Video input pin header is shown below

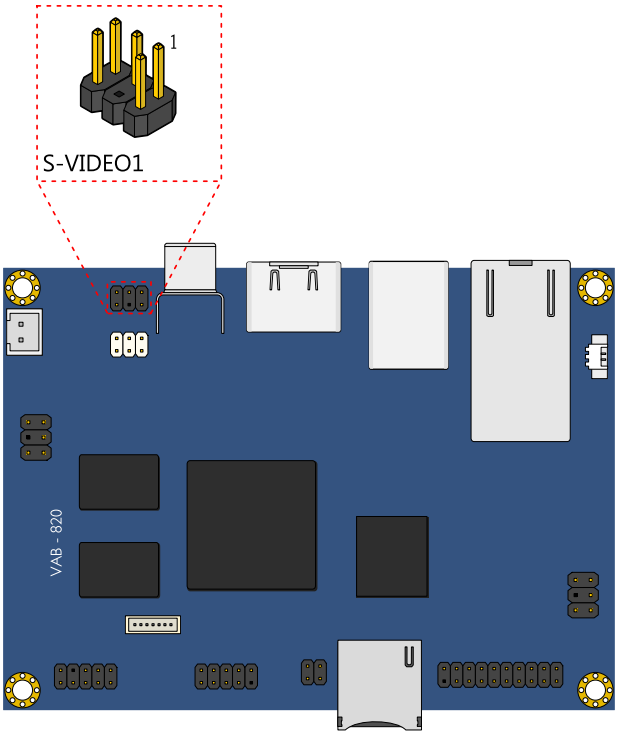


Figure 18: S-Video input pin header diagram

Pin	Signal	Pin	Signal
1	C	2	GND
3	Y	4	-
5	NC	6	GND

Table 17: S-Video input pin header pinout

2.2.9. Mini-PCIe Slot

The Mini-PCIe slot is compatible with all PCIe 2.0 Mini Cards: full-length and half-length. The location of the Mini-PCIe slot is shown below.

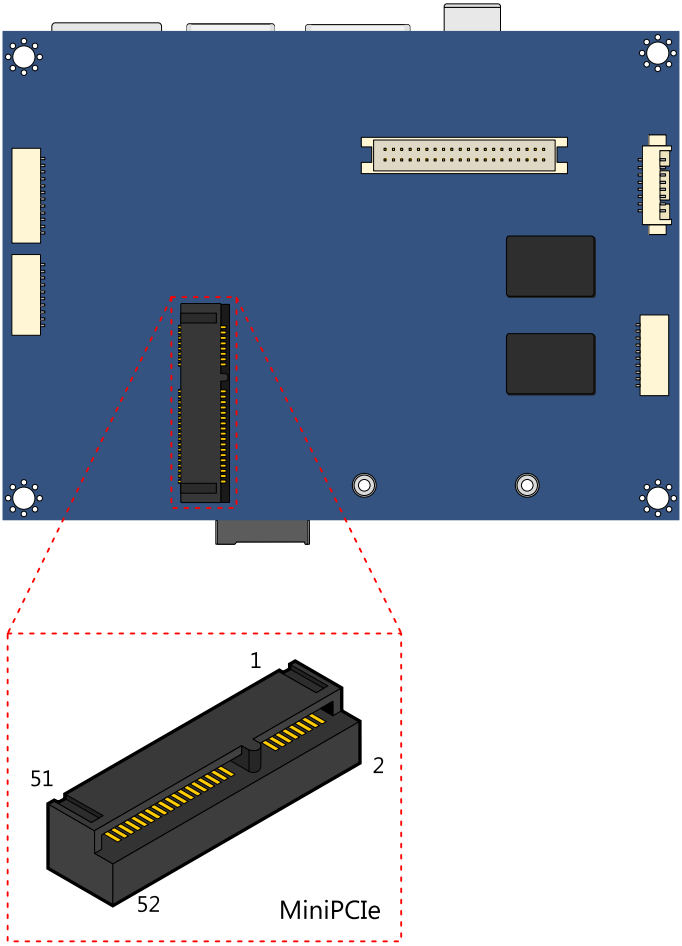


Figure 19: Mini-PCIe slot diagram

Pin	Signal	Pin	Signal
1	PCIE_WAKE_B	2	MPCIE_3V3
3	GND	4	GND
5	JTAG_TCK	6	VCC15
7	JTAG_TMS	8	-
9	GND	10	NC
11	PCIe_CREFCLKM	12	NC
13	PCIe_CREFCLKP	14	NC
15	GND	16	-
17	JTAG_TD1	18	GND
19	JTAG_TD0	20	PCIE_DIS_B
21	GND	22	PCIE_RST_B
23	PCIe_CRXM	24	MPCIE_3V3
25	PCIe_CRXP	26	GND
27	GND	28	VCC15
29	GND	30	PCIe_SMB_CLK
31	PCIe_CTXM	32	PCIe_SMB_DATA
33	PCIe_CTXP	34	GND
35	GND	36	PCIE_USB_DM
37	GND	38	PCIE_USB_DP
39	MPCIE_3V3	40	GND
41	MPCIE_3V3	42	LED_WWAN_B
43	GND	44	LED_WLAN_B
45	JTAG_nTRST	46	LED_WPAN_B
47	JTAG_nSRST	48	VCC15
49	GND	50	GND
51	NC	52	MPCIE_3V3

Table 18: Mini-PCIe slot pinout

2.2.10. LVDS1 Connector

The mainboard has one 40-pin LVDS panel connector on the bottom side. The onboard LVDS panel connector allows to connect the panel's LVDS cable to support the dual-channel 18-bit/24-bit display. Backlight controls are integrated into the LVDS panel connector pinout. The LVDS panel connector is labeled as "LVDS1". The pinout of the connector is shown below.

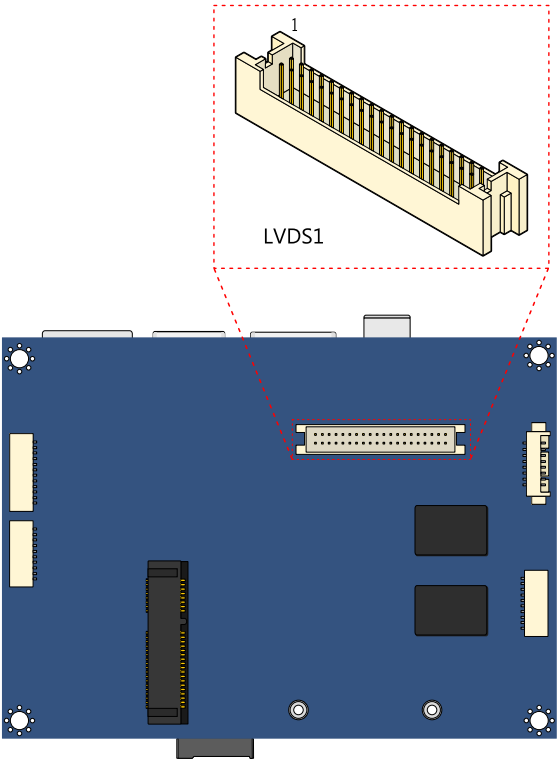


Figure 20: LVDS1 connector diagram

Pin	Signal	Pin	Signal
1	LVDS1_TX0_NC	2	PVDD
3	LVDS1_TX0_PC	4	PVDD
5	GND	6	GND
7	LVDS1_TX1_NC	8	GND
9	LVDS1_TX1_PC	10	LVDS0_TX0_NC
11	GND	12	LVDS0_TX0_PC
13	LVDS1_TX2_NC	14	GND
15	LVDS1_TX2_PC	16	LVDS0_TX1_NC
17	GND	18	LVDS0_TX1_PC
19	LVDS1_CLK_NC	20	GND
21	LVDS1_CLK_PC	22	LVDS0_TX2_NC
23	GND	24	LVDS0_TX2_PC
25	LVDS1_TX3_NC	26	GND
27	LVDS1_TX3_PC	28	LVDS0_CLK_NC
29	GND	30	LVDS0_CLK_PC
31	5VIN	32	GND
33	3P3V	34	LVDS0_TX3_NC
35	NC	36	LVDS0_TX3_PC
37	NC	38	LVDS0_EDID_SCL
39	NC	40	LVDS0_EDID_SDA

Table 19: LVDS1 connector pinout

2.2.11. LVDS Inverter Connector

The mainboard provides LVDS Inverter connector located on the bottom side of the board for supplying power to the backlight of the LCD panel. The connector is labeled as "INVERTER". The pinout of the connector is shown below.

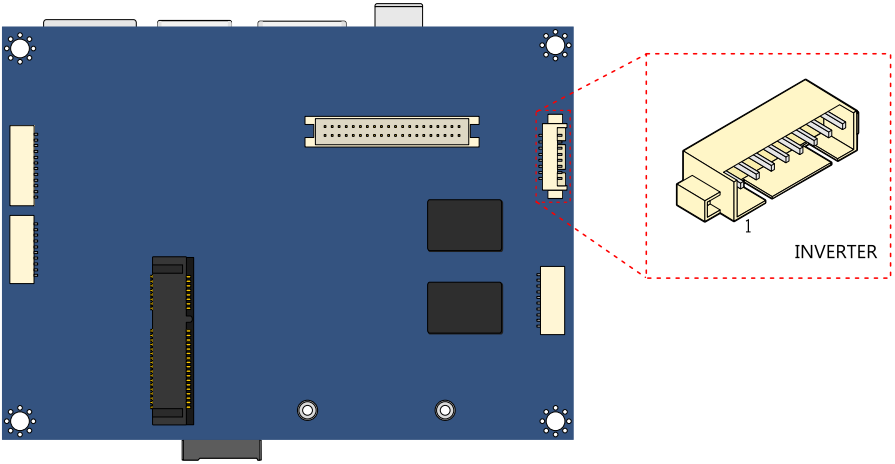


Figure 21: LVDS Inverter Connector diagram

Pin	Signal
1	IVDD
2	IVDD
3	LVDS_EN
4	DISP0_CONTRAST
5	LVDS_EN
6	DISP0_CONTRAST
7	GND
8	GND

Table 20: LVDS Inverter Connector pinout

2.2.12. MIPI CSI-2 Connector

The mainboard includes one MIPI CSI-2 connector on the bottom side of VAB-820. The MIPI CSI-2 connector is used to connect to camera serial interface in order to support a wide range of imaging solutions. The connector is labeled as "J18". The pinout of the connector is shown below.

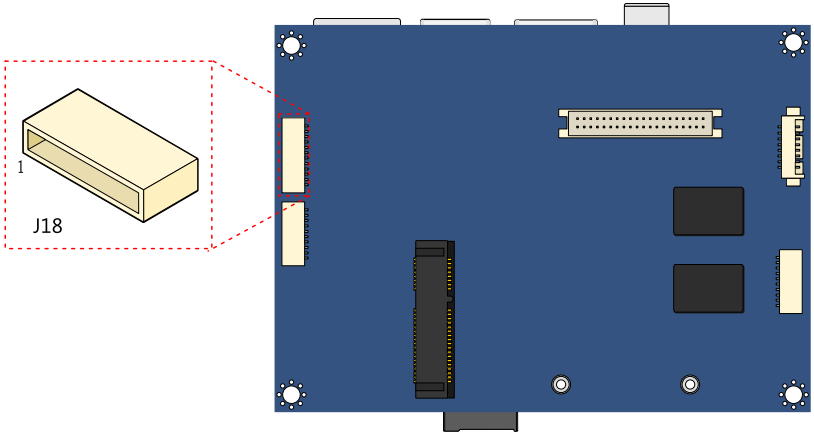


Figure 22: MIPI CSI-2 connector diagram

Pin	Signal
1	5VIN
2	I2C2_SCL
3	I2C2_SDA
4	GND
5	CSI_CLK0P
6	CSI_CLK0M
7	GND
8	CSI_D0P
9	CSI_D0M
10	GND
11	CSI_D1M
12	CSI_D1P

Table 21: MIPI CSI-2 connector pinout

2.2.13. COM1/COM2/CAN Connector

The mainboard includes two onboard COM connectors on the bottom side of VAB-820. The onboard COM1 connector labeled as "J4" is used to attach additional COM port that support RS-232 standard with DTE (Data Terminal Equipment) type. The onboard COM2/CAN connector labeled as "J5" is primarily used to attach additional COM port for debug purpose. The CAN bus can also be supported through this connector. The pinout of COM/CAN connector is shown below.

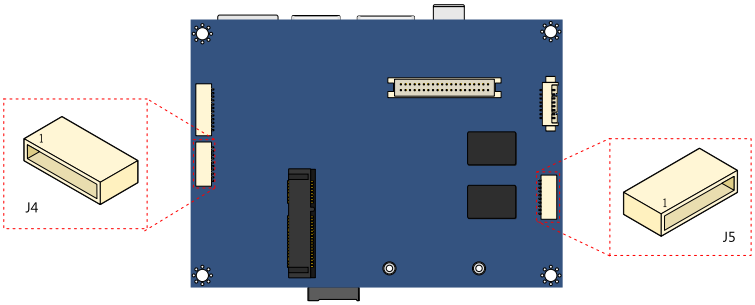


Figure 23: COM1/COM2/CAN connector diagram

COM1		COM2/CAN	
Pin	**Signal**	**Pin**	**Signal**
1	5VIN	1	5VIN
2	COM_RXD1	2	COM2_RX
3	COM_TXD1	3	COM2_TX
4	COM_DCD1	4	NC
5	COM_RI1	5	NC
6	GND	6	GND
7	COM_DTR1	7	CAN_RX2
8	COM_CTS1	8	CAN_TX2
9	COM_RTS1	9	CAN_TX1
10	COM_DSR1	10	CAN_RX1

Table 22: COM1/COM2/CAN connector pinout

Note:

For CAN bus communication, the physical bus requires an external transceiver to make the transfer.

3. Jumpers

3.1. LVDS Power Select Jumper

The mainboard has power select connector that determines the input voltage for the LVDS connector (LVDS1) and LVDS inverter (INVERTER1). The pins 1, 3, and 5 correspond to INVERTER1. The Pins 2, 4, and 6 correspond to LVDS1. The jumper is labeled as "J3" .The jumper settings are shown below.

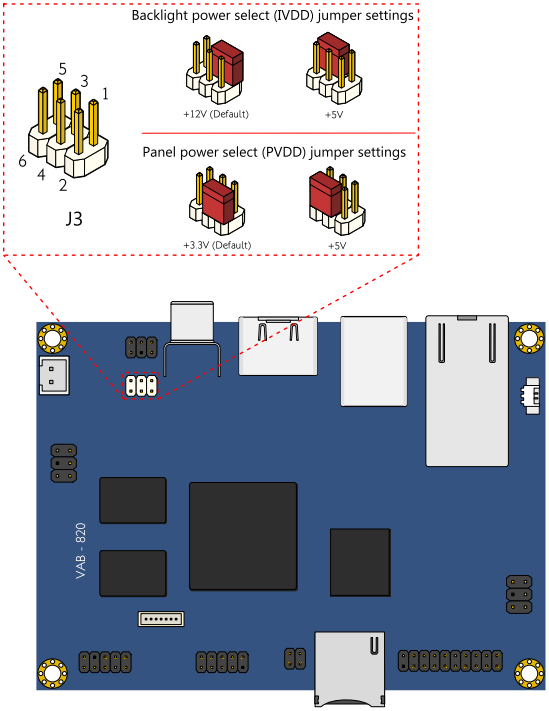


Figure 24: LVDS power select jumper diagram

Inverter power	Pin 1	Pin 3	Pin 5
+12V (default)	On	On	Off
+5V	Off	On	On
LVDS power	**Pin 2**	**Pin 4**	**Pin 6**
+3.3V (default)	On	On	Off
+5V	Off	On	On

Table 23: LVDS power select jumper setting

3.2. Boot Select Jumper

The Boots Select jumper labeled as "J11" is to specify the boot device.

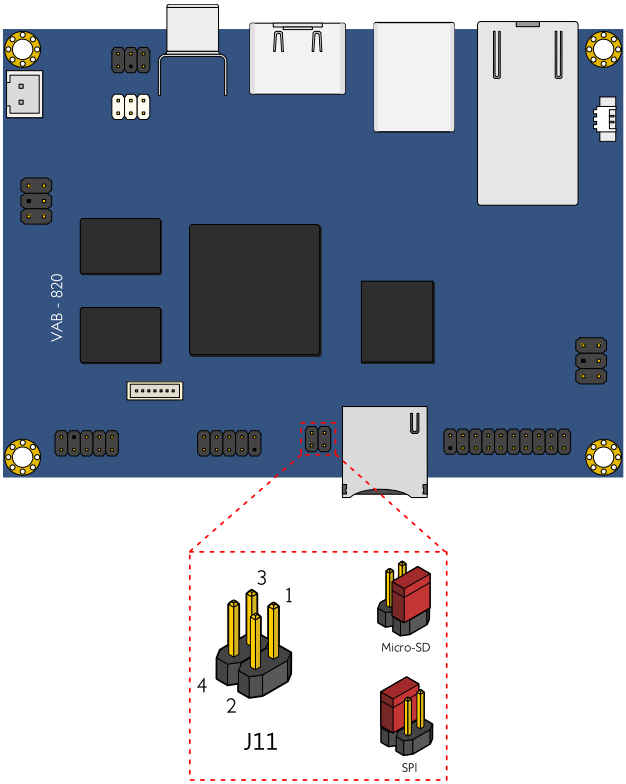


Figure 25: Boot Select jumper diagram

	J11: Boot Select	
	1-2	3-4
★Micro-SD (default)	short	open
SPI	open	short

Table 24: Boot Select jumper settings

4. Hardware Installation

4.1. Installing into a Chassis

The VAB-820 can be fitted into any chassis that has the mounting holes compatible with the standard Pico-ITX mounting hole locations. Additionally, the chassis must meet the minimum height requirements for specified areas of the mainboard.

4.1.1. Suggested minimum chassis dimensions

The figure below shows the suggested minimum space requirements that a chassis should have in order to work well with the VAB-820.

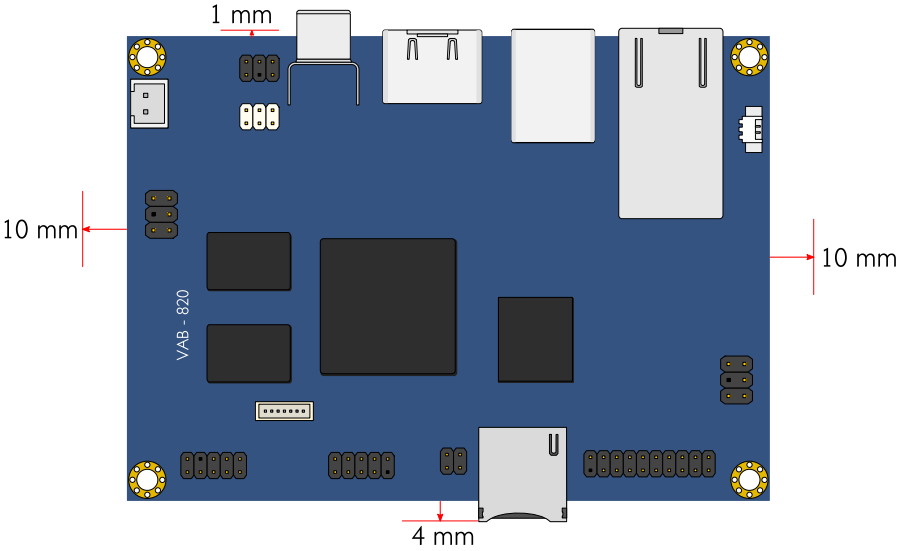


Figure 26: Suggested minimum chassis dimensions

Each side of the mainboard should have a buffer zone from the internal wall of the chassis. The side of the mainboard that accommodates the I/O coastline should have a buffer of 1.00 mm. The side on the opposite end of the I/O

coastline should have a buffer of at least 4.00 mm. The two sides adjacent to the I/O coastline should have at least a 10.00 mm buffer.

4.1.2. Suggested minimum chassis height

The figure below shows the suggested minimum height requirements for the internal space of the chassis. It is not necessary for the internal ceiling to be evenly flat. What is required is that the internal ceiling height must be strictly observed for each section that is highlighted.

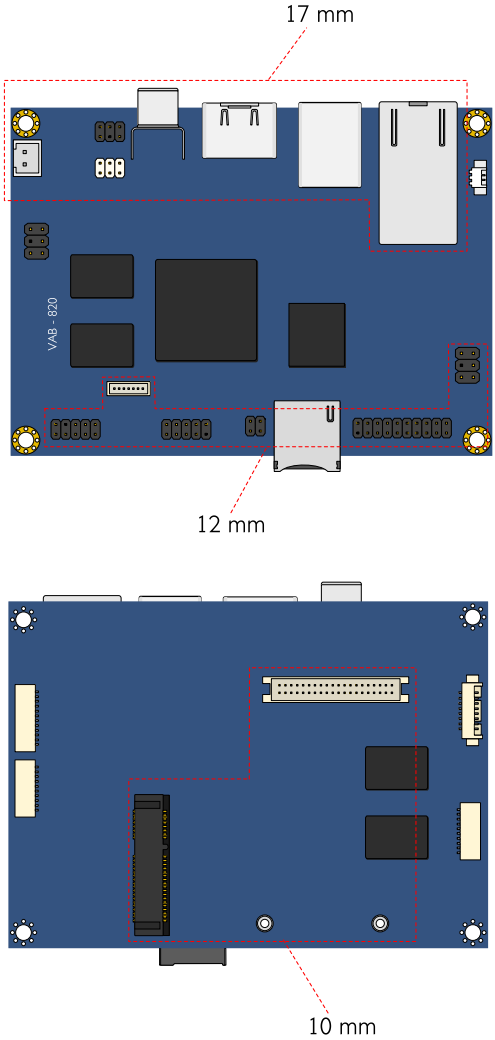


Figure 27: Suggested minimum internal chassis ceiling height

4.1.3. Suggested keepout areas

The figure below shows the areas of the mainboard that is highly suggested to leave unobstructed.

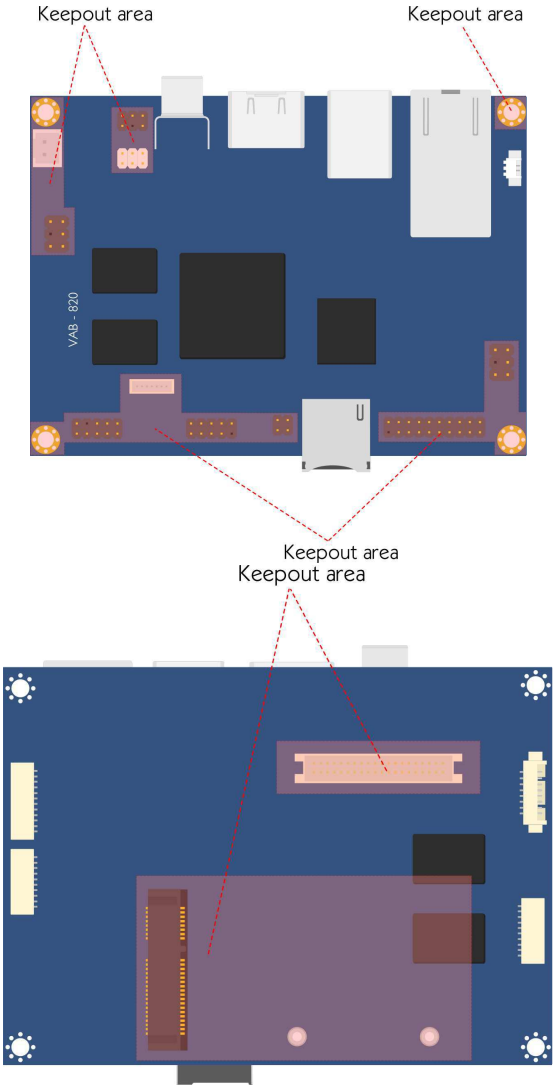
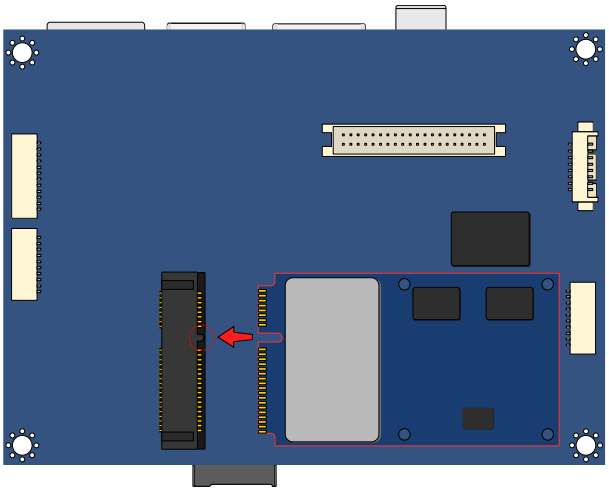


Figure 28: Suggested keepout areas

4.2. Installation of Mini-PCIe module

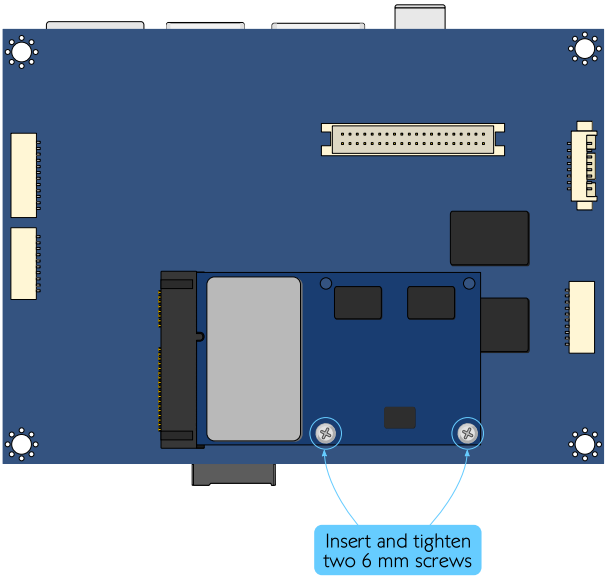
Step 1

Align the notch on the Mini-PCIe module with the notch on the Mini-PCIe slot then insert the module at 30° angle.



Step 2

Once the module has been fully inserted, push down the module until the screw holes align with the mounting holes on the hex spacer screws. Secure the module with two screws to the standoffs.



Appendix A. Mating Connector Vendor Lists

The following table listed the mating connector vendors of VAB-820 mainboard.

Connectors	Vendor & P/N	Mating Vendor & P/N	
J1	99G30-170512	ACES 85206-0200	MOLEX 51021-**00
INVERTER	99G30-170542	ACES 85206-0800	MOLEX 51021-**00
LVDS1	99G30-170152	ACES 44002-4000	HRS DF13-**DS-1.258C
J10	99G30-170852	ACES 87214-0700	
J4 & J5	99G30-021457	ACES 87214-1000	
J18	99G30-170642	ACES 87214-1000	
S-VIDEO1	99G30-05474I	Neltron 2208S-XXG 2208R-XXG 2208SM-XXG	SAMTEC SSW Series
AUDIO1	99G30-05454I		
J8	99G30-05380I		
J7	99G30-05301I		
J9	99G30-021525	Neltron 2318HJ-02	JST XH Series
J13, J14	99H30-05770K	Neltron 2214S-XXG-85 2214R-XXG-85	SAMTEC SSW Series

Table 25: VAB-820 mating connector vendor lists

VIA Embedded

Taiwan Headquarters
1F, 531 Zhong-Zheng Road
Xindian District, New Taipei City 231,
Taiwan

TEL: 886.2.2218.5452
FAX: 886.2.2218.5453
Email: embedded@via.com.tw

USA
940 Mission Court
Fremont, CA 94539
USA

TEL: 1.510.683.3300
FAX: 1.510.687.4654
Email: embedded@viatech.com

Europe
In den Dauen 6
53117 Bonn
Germany

TEL: 49.228.688565.0
FAX: 49.228.688565.19
Email: embedded@via-tech.de

China
Tsinghua Science Park Bldg. 7
No. 1 Zongguancun East Road
Haiden District, Beijing, 100084
China

TEL: 86.10.59852288
FAX: 86.10.59852299
Email: embedded@viatech.com.cn

Japan
3-15-7 Ebisu MT Bldg. 6F
Higashi, Shibuya-ku
Tokyo 150-0011
Japan

TEL: 81.3.5466.1637
FAX: 81.3.5466.1638
Email: embedded@viatech.co.jp

Korea
2F, Sangjin Bldg., 417
Dogok Dong, Gangnam-Gu
Seoul 135-854
South Korea

TEL: 82.2.571.2986
FAX: 82.2.571.2987
Email: embedded@via-korea.com